DOCUMENT RESUME

ED 076 584 SP 006 521

AUTHOR Borg, Walter R.
TITLE Research and Development As a Vehicle for Improving Teacher Competence.
PUB DATE Feb 73
NOTE 15p.; Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, Louisiana, February 1973

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Instructional Improvement; *Program Effectiveness; Research; Research Design; Research Methodology; *Research Utilization; *Teacher Education; Teacher Education Curriculum; *Teacher Evaluation; *Teacher Programs

ABSTRACT

The most essential element in the Research and Development (R&D) process is the provision for repeated field testing, evaluation, and revision until the product reaches its objectives. This process can be implemented to improve the instructional process in two ways: to improve the instructional skills and strategies of teachers; and to develop more effective curriculum material for use in the schools. To test the effectiveness of an instructional method, one must first identify the specific elements that go into the successful use of that method and, secondly, involve in research teachers who effectively apply behaviors and strategies essential to this method. Most present teaching methods are not well-defined enough to permit such research. In fact, conventional teacher programs today are ineffective because they lack definition, an effective instructional model, objectives and evaluation, generalizability, and resources. In contrast, R&D efforts have made good strides towards defining teaching skills, providing teacher access to objective evaluation data that indicates which aspects have succeeded or failed, and developing components such as minicourses to serve as resources. R&D could similarly aim towards developing tested curriculum components. (JA)

FORM 5610 PRINTED IN U.S.A.

FILMED FROM BEST AVAILABLE COPY

ED 076584

SP006 521

RESEARCH AND DEVELOPMENT AS A VEHICLE FOR IMPROVING TEACHER COMPETENCE[1]

U S DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

by

Walter R. Borg

UTAH STATE UNIVERSITY

The thesis that I will put forth in this paper is that widespread implementation of the research and development process in education offers our best chance of bringing about instructional improvement. I will define R and D as a process which involves as a minimum the steps shown in Figure 1. The most critical element in the process is the provision for repeated field testing, evaluation and revision until the product reaches its objectives.[2] There are two important ways that R & D technology can be applied to the improvement of the instructional process. The first of these focuses on the development of programs designed to improve the instructional skills and strategies of teachers. The second is to apply R & D technology to develop more effective curriculum materials for use in the schools.

The first of these approaches, which focuses on the improvement of instructional skills, probably offers the best chance of bringing about significant instructional improvement during the decade of the '70's. Once mastered by the teacher, basic instructional skills and strategies can be applied by teachers to a wide range of teaching situations and

---

[1] Read at AERA annual meeting, New Orleans, Feb. 1973.

[2] Other versions of the R & D cycle may be found in Baker, Robert L. and Schutz, Richard E. Instructional Product Development, New York: Van Nostrand Reinhold, 1971, and in Borg, Walter R. et al The Minicourse - A Microteaching Approach to Teacher Education, Beverly Hills, Calif.: Macmillan Educational Services, 1970.

will improve the effectiveness of instruction even if the teacher continues to use curriculum materials that have not been rigorously developed. During the past seven years, my work has been concerned primarily with improvement of instructional skills. One of the first things that we learned when we started the Teacher Education Program at the Far West Laboratory was that most experienced teachers in today's classrooms make very little use of even the most basic instructional skills. Since our strategy involved the use of model teachers to demonstrate specific teaching skills, we sought out teachers reputed to be superior and observed in their classes. We found virtually no teachers who used the skills we had identified effectively and with moderate frequency. We finally concluded that the only way to get a model teacher to demonstrate these skills effectively was to train the teacher through a long series of practice and feedback sessions. Our experience with model teachers was supported when we took our first Minicourse into the field for testing. One of our evaluation techniques involved making videotape recordings of the field test teachers' performance before and after training. Again, upon analysing these tapes, we found that the pretraining performance of most experienced teachers reflected very little mastery of basic teaching skills. For example, prompting has been widely accepted as an effective strategy for teachers to use in discussion lessons when the student fails to give an adequate response. Yet, we found that for the 48 teachers in our Minicourse 1 field test, the mean number of prompts employed by participating teachers in a twenty minute discussion lesson was only four. Similarly a skill evaluated in Minicourse 2 was teacher use of specific praise. In a ten minute language lesson, the 47 field test teachers used specific praise an average of .6 times. Neither of these groups of field test teachers were novices. In fact, both groups averaged 8 to 9 years of teaching experience.

Some disturbing evidence that suggests how little skill the average teacher has developed is reported in Popham's study in which he found that when pupil achievement was employed as a criterion, experienced teachers could produce no better performance on the average than inexperienced non-teachers.[3] This finding was supported by later work by Moody and Bausell.[4] Although both studies involved small samples and had other methodological limitations, their implications cannot be ignored and in fact are not surprising in view of the sorry state of most teacher education programs.

Some practitioners cite the many studies that have compared teaching methods and found no differences as a basis for making the assumption that any attempts to improve pupil achievement by focusing on better teacher education is futile. However, when one looks into the research comparing teaching methods, the weaknesses of this conclusion become apparent. First, in most such research, teachers are asked to employ Method A or Method B with no effort being made to determine whether the teacher can use the method effectively, or for that matter, without even defining the method in specific terms. As Wallen and Travers pointed out ten years ago, "Research on teaching methods which will contribute to an organized body of scientific information, requires that teaching methods themselves be designed systematically in terms of empirically established learning principles. The design of teaching methods represents a branch of educational technology which is still in its infancy, but the development of this

---

[3] Popham, W.J. "Performance Tasks of Teaching Proficiency: Rationale Development and Validation" American Educational Research Journal, 1971, 8, 105-117.)

[4] Moody, William B. and Bausell, R. Barker, The effect of teacher experience on student achievement, transfer, and retention. Presented at the AERA annual meeting, New York, February, 1971.

technology is necessary for the advancement of educational practice."[5] In other words, simply defining a method such as discussion as "what the average teacher does when you ask her to conduct a discussion lesson" is not sufficient to make any appraisal of the effectiveness of the method. To test the effectiveness of an instructional method, you must first identify the specific elements that go into the successful use of that method and secondly, you must have teachers involved in your research who effectively apply the behaviors and strategies that are essential to the method. Researchers rarely train teachers to criterion level of effectiveness in methods that they are attempting to study. If we wanted to compare the tonal quality of two violins, we would hardly do so by asking someone to play the two instruments who had had no training and couldn't carry a tune.

Most teaching methods at this time are not sufficiently well defined to permit meaningful research on their relative effectiveness. Many of the essential elements necessary for successful use of specific methods have only been partially identified, and certainly have not been part of the training received by preservice or inservice teachers. The result is that very few teachers use any instructional method effectively. Teachers can hardly be blamed for their poor teaching performance, since preservice teacher education programs have taught them little or nothing about the specifics of teaching.

Conventional preservice teacher education programs have a number of serious deficiencies that have made them largely ineffective. For this

---

[5] Wallin, Norman E. and Travers, Rober M.W. "Analysis and Investigation of Teaching Methods" in Gage, N.L. (ed.) Handbook of Research on Teaching. Chicago, Rand McNally, 1963.

paper I will define conventional programs as those that do not focus on specific teacher skills and competencies, do not involve practice of these skills and competencies and do not provide the learner with specific feedback on his performance. Let me review some of the serious deficiencies found in most teacher education programs and suggest ways that the application of rigorous research and development can overcome these deficiencies.

Lack Definition: A major deficiency of conventional programs is that they lack definition. Most deal in generalities and have rarely established specific objectives or identified specific skills that the learner is expected to master. R & D efforts have already made a good start towards defining important teaching skills in operational terms. Perhaps the most noteworthy effort along these lines has been the program carried out at the Stanford Center for Research and Development in Teaching over the past ten years.[6] Rosenshine's recent work in pulling together previous research relating specific teaching behavior to learner achievement has also been a significant step.[7] The definition of specific outcomes is an important early step in the R & D process. For example, in developing Minicourses, the Teacher Education Program at the Far West Laboratory started by identifying a cluster of specific teaching behaviors that appears to be important to a given method or strategy and then framing objectives in terms of the learner's ability to emit the behaviors at the end of training. Thus, if followed closely, the very nature of the R & D

---

[6] Allen, D. and Ryan, K. Microteaching. Reading, Mass.: Addison-Wesley, 1969.

[7] Rosenshine, B. Teaching Behaviors and Student Achievement. New York: Humanities Press, 1971.

process precludes the development of aimless or poorly defined products.

Lack of an Effective Instructional Model: Conventional teacher education programs typically lack an effective instructional model. Most have systematically ignored the relevant principles of learning. These programs have emphasized telling rather than doing, although the need for practice as a step in mastering skills is well established. Although there is now a considerable body of research that establishes the value of models in helping a learner develop new behavior patterns, effective models are rarely provided in conventional teacher education programs. Finally, students in such programs do not receive effective feedback on their performance. Theoretically, student teaching has been the place where the learner would practice his teaching skills, emulate the supervising teacher as a model and receive effective feedback from the student teaching supervisor. However, the learner's practice is not focused on the mastery of specific skills or strategies, the supervising teacher rarely models any specific behaviors and the student teaching supervisor rarely gives feedback except in general and meaningless terms. As a result, almost none of the promise inherent in student teaching has been realized. Most teachers learn whatever skills they have by trial and error. Those who try out a wide variety of approaches and are sensitive to feedback from their students gradually master important skills. A few teachers, perhaps one in ten, become highly skilled through utilizing trial and error and making effective use of learner feedback. The great majority, however, never really learn very much about teaching, and muddle through year after year, using methods that are no more effective, as Popham's data would suggest, than procedures used by persons who have received no formal teacher training whatsoever.

Lack of Evaluation: Another weakness of most conventional teacher

education programs is lack of evaluation. Typically such programs have had no performance objectives, and as a result there has been no sound basis for rigorous evaluation. Even when promising innovations emerge from conventional programs, they rarely make any permanent impact on the field of teacher education. This is because they rely almost entirely upon subjective general impressions to determine effectiveness. Given a good enough sales pitch, a promising innovation may be adopted in various forms by a number of other institutions even though no evidence of its effectiveness exists. However, without the support of such evidence, the innovation becomes little more than a fad to be displaced by the next fad that comes along. In the case of a research and development product, the potential user has access to objective evaluation data. Thus, he is more likely to adopt the product because he has evidence that it works rather than because it tickles his fancy. The presence of evidence may also lead him to stay with the R & D product until another comes along that provides better evidence of effectiveness.

Conventional teacher education programs have virtually never provided objective answers to such questions as: What specific competency should the learner demonstrate at the end of training? What parts of the program need further revision in order for the learners to reach criterion levels of performance? What specific kinds of revision appear necessary? To what extent does the program as a whole bring about the desired levels of teacher performance and student achievement? These are, of course, the basic questions dealt with in the formative and summative evaluation phases of the educational research and development process. Through repeated cycles of revision and evaluation, the product of research and development gradually reaches the point where it achieves its objectives.

Even if the product never reaches that point, the evaluation process makes the developer fully aware of the product's deficiences. Thus, the R & D process tells us something that is almost never known in specific terms about conventional teacher education programs. We know what aspects of the program have succeeded and what aspects have failed.

Lack of Generalizability: Because conventional programs have not undergone a rigorous R & D cycle, even the more promising aspects of the conventional program cannot be readily adopted by another institution. Without field testing and revision, such innovations almost always contain a significant proportion of ineffective material and also omit much that is needed to implement the innovation in a new setting. The innovator can make his innovation work in his own classes largely because he has gained experience and insights that are not available to other persons who attempt to use it. Thus, we find that when other users attempt to adopt an untested innovation, they have a great deal of difficulty and must improvise and adapt extensively. Since users differ greatly in their ability to make such adaptations, we end up with many bastardized versions of what might have been a worthwhile innovation. Thus, we frequently find a situation such as existed when team teaching was being pushed by the Ford Foundation. Each school adopted little beyond the basic concept and improvised from that point. The outcome was that attempts to implement team teaching differed drastically from one school to another and most of them were abandoned within a year after implementation.[8]

---

[8] Borg, Walter R. Teacher effectiveness in team teaching. Journal of Experimental Education, 1967, 35, 65-70.

Lack of Resources: The building of conventional teacher education programs has, for the most part, been a local affair. Each college and university has, over a period of years, put together a series of courses that are supposed to be relevant to the training of teachers. Many small teacher's colleges have had virtually no money or talent to devote to this effort. However, more serious perhaps is the fact that not even our greatest universities have sufficient money and talent to develop as good a program of teacher education as is possible with our present state of knowledge and expertise. The task of building educational products and strategies the quality of which approach our current capabilities is very costly indeed. Minicourses, which are among the most effective teacher education products that have emerged from educational R & D were developed at an average cost of about $112,000 each.[9] When you consider that each Minicourse involves about the same amount of learner time as a one semester-hour college course, you can see that a total teacher education program developed through a rigorous R & D process could be very expensive. Thus, even the best funded universities would find it very difficult to develop everything needed for a first-rate program in teacher education. This was amply demonstrated by the attempt by USOE to develop ten model elementary programs at major institutions. Although 5 years and considerable money has been put into this effort, not one of the participating institutions has a fully developed and evaluated program to this date. Furthermore, even if the resources were available, it would be very wasteful for such programs to be developed for use at only one institution. Independent development of teacher education programs such as we have had in the past has produced a very large number of teacher education programs, few of

---

[9] Borg, Walter R. The Cost of Different Phases of the Research and Development Cycle. Presented at the AERA annual meeting, Chicago, April, 1972.

which are very good and most of which are very poor.

What we need to improve teacher competence, and what research and development can provide, is a large number of tested components, such as Minicourses and Protocol Materials from which the local teacher training institution can select those most relevant to its goals in order to assemble an effective program. If this strategy were employed, each component would be fully tested and evidence would be available on its effectiveness in achieving its specific objectives. Although no university has resources to develop a total program of teacher education, a great many have sufficient resources to build a few high quality components. This appears to be recognized by some of the universities that are involved in the aforementioned Elementary Teacher Education Models program. Several of these universities are now devoting their efforts to building modules of the sort to which I am referring. If this direction were taken by a significant number of our universities we could develop literally hundreds of high quality components by the end of this decade that could be made available to all teacher training institutions. Programs assembled from these components would almost surely bring about a significant improvement in the instructional skill of future teacher education graduates.[10] Many such components could also be adapted for use in inservice training programs and could gradually raise the quality of instruction provided by experienced teachers who have received inadequate preservice training. Although a great deal remains to be done, much of the foundation needed to develop a bank of tested instructional modules in teacher education has already been built. At the University

---

[10] The Univ. of Nebraska competency-based program, although not fully developed at this time, has already produced evidence that such programs can produce more skillful teachers and improvements in pupil achievement. See Sybouts, Ward. "Performance-Based Teacher Education: Does it make a Difference?" Phi Delta Kappan, 1973, 46 (5), 303-304.

of Houston, Weber and his associates are assembling a library of teacher education modules. A similar activity, the Florida Center for Teacher Training Materials directed by Spino at the University of Miami, has produced a catalog of compentency-based teacher training materials. Gliessman and his associates at Indiana University have been concerned with the process of educational development. They are building prototype modules and conducting training programs for educational developers. The sixteen protocol material projects currently being funded by USOE are developing and evaluating modules designed to help teachers relate basic teaching concepts to classroom application. Over a dozen rigorously developed modules have already been completed by these projects and more are on the way. The Far West Laboratory in San Francisco and the Northwest Laboratory in Portland have both developed competency-based instructional programs for teacher education.[11] Although time does not permit my listing all such efforts, the above examples should be enough to demonstrate that the use of R & D technology to build better materials for teacher education is well underway.

R & D Programs to Improve Curriculum: At the start of this paper, I mentioned that extensive use of the research and development process could improve instruction in two ways: by improving instructional skills of teachers and by developing more effective curriculum materials. Although my main emphasis has been upon instructional skills, I would like to comment briefly upon curriculum. Most of the deficiencies found in conventional teacher education programs are also present in conventional curriculum programs and materials. The vast majority of curriculum materials now available to public schools have poorly defined objectives. There

---

[11] Many of these modules have been incorporated into the General Teaching Skills Clinic developed by Sobol at Florida International University.

is virtually no objective evidence available on the effectiveness of most curricular materials and with a few noteworthy exceptions, such as IPI, they are not sufficiently complete to be used effectively by the average teacher.

The educational research and development process that I've suggested for use in improving teacher education can and has been applied to the development of effective curriculum programs. The development of a sufficient number of fully tested curriculum components to meet the needs of elementary and secondary education is a gigantic task, many times greater than the development of an effective teacher education program. However, a number of rigorously developed instructional systems have been completed and are now available to educators. The Technological Applications Project (TAP) has recently produced a catalog describing 50 instructional systems that have gone through a rigorous R & D cycle and are now available for use. Each system has undergone analysis and evaluation and all meet criteria established by TAP. A similar catalog describing 200 instructional systems will be published by TAP during the coming summer.[12] Thus, a start has been made towards bringing together tested materials from which improved curriculums can be built. However, it is obviously not enough to build one effective curriculum. The teacher should have several instructional modules of proven effectiveness available to achieve each objective selected for a particular school. When the tremendous task of providing two or three alternative components to meet each major educational objective

---

[12] Information obtained in personal communication with James E. Buck, Associate Director, Technical Applications Project, P.O. Box 1028, Corvallis, Oregon 97330.

of the public schools has been completed, it will be possible for the teacher or school district to assemble a curriculum or proven effectiveness from among the components available. At this point, the teacher will be able to assume a professional role somewhat similar to the medical practitioner. Practicing physicians rarely discover new drugs or develop new treatments. Their task essentially is to diagnose the patient, prescribe medication or treatment from among those alternatives that have been developed and tested by medical researchers, and check on the patient's progress. Think where the medical profession would be today if each physician were expected to develop all of his own medications and treatments. However, such a state of affairs would be no more ridiculous than the expectation of many educators that each teacher must develop his or her own curriculum and, furthermore, this curriculum must be different for every child. This is, of course, a romantic notion that places the teacher somewhat in the role of a super person. It is, unfortunately, also a notion that has done and is doing a tremendous amount of harm to education and to improvement of the learning process.

Let me summarize by saying that the development of effective teacher training and curriculum materials using the R&D process offers our best hope of bringing about significant instructional improvement during the decade of the 70's. In the past few years, educational research and development has become more than a promising possibility for bringing about change. Enough educational products and strategies have been developed using a rigorous R & D process to demonstrate beyond any doubt that this process does work and does produce superior educational products. During the past few years, we have also learned a great deal about the educational research and development process itself. The process has been greatly

refined since the stumbling efforts at curriculum development that were funded by National Science Foundation fifteen years ago.[13] Furthermore, we now have a nucleus of trained developers in education who are capable, not only of conducting rigorous educational development, but also of training other persons to do so. All the ingredients save one are now present to set into motion a major breakthrough in instructional improvement. The one additional ingredient we need is a major commitment by federal funding agencies to support such a program until this important task has been accomplished.

---

[13] See McClure, R. M. The Curriculum: Retrospect and Prospect. Chicago: National Society for the Study of Education, 1971.

FIGURE 1

MINIMUM EDUCATIONAL RESEARCH AND DEVELOPMENT CYCLE